



OPERATING PERMIT Issued Pursuant to Tennessee Air Quality Act

Date Issued: March 18, 2016

Permit Number:
071375P

Date Expires: November 30, 2025

Issued To:
Axiom Impressions, LLC

Installation Address:
104 Challenger Drive, Suite 300
Portland

Installation Description:
Printing Operation; includes five (5) heatset offset lithographic
printing presses, five (5) gas-fired dryers (rated 15 MMBtu/hr, total),
and one regenerative thermal oxidizer (5.8 MMBtu/hr)

Emission Source Reference No.
83-0468-01

The holder of this permit shall comply with the conditions contained in this permit as well as all applicable provisions of the Tennessee Air Pollution Control Regulations.

GENERAL CONDITIONS:

1. The application that was utilized in the preparation of this permit is dated **February 18, 2016**, and is signed by **Rick Morrison**, Plant Manager, for the permitted facility. If this person terminates employment or is reassigned different duties and is no longer the responsible person to represent and bind the facility in environmental permitting affairs, the owner or operator of this air contaminant source shall notify the Technical Secretary of the change. Said notification shall be in writing and submitted within thirty (30) days of the change. The notification shall include the name and title of the new person assigned by the source owner or operator to represent and bind the facility in environmental permitting affairs. All representations, agreement to terms and conditions and covenants made by the former responsible person that were used in the establishment of limiting permit conditions on this permit will continue to be binding on the facility until such time that a revision to this permit is obtained that would change said representations, agreements and covenants.

(conditions continued on next page)

Technical Secretary

No Authority is Granted by this Permit to Operate, Construct, or Maintain any Installation in Violation of any Law, Statute, Code, Ordinance, Rule, or Regulation of the State of Tennessee or any of its Political Subdivisions.

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2. Total volatile organic compounds (VOC) emitted from this source shall not exceed **38.7** tons during all intervals of twelve (12) consecutive months. This limitation is established pursuant to paragraph 1200-03-07-.07(2) of the Tennessee Air Pollution Control Regulations (TAPCR).
3. Facility-wide emissions of combined hazardous air pollutants (HAP), listed in Section 112 of the Federal Clean Air Act, shall not exceed **9.9** tons during all intervals of 12 consecutive months. In the event that the combined HAP emission rate from entire facility is ten (10) tons or more, during any period of twelve (12) consecutive months, the permittee shall provide a written notification of the exceedance(s) to the Technical Secretary within fifteen (15) days from the date of discovery. TAPCR 1200-03-07-.07(2).
4. Logs in the following format, or another format providing the same information, for the lithographic web heatset offset presses (presses C150#1, Mag#1, Mag#2, Mag#3 and Mag#4) must be maintained to assure compliance with Condition 3. The logs must be retained for a period of not less than three (3) years. Calculations of monthly VOC emissions must be completed within 30 days of the end of any month.

Log 1 - Heatset Ink Emissions:

Month/year	Material Used	Amount Used (gal/mo)	Density (lb/gal)	VOC Weight Fraction	Web Retention factor* (%)	VOC Overall Control Efficiency factor** (%)	VOC Emissions (lb/mo)
	Ink(s)				80	98.8	

* Multiply weight of VOC ink used by 0.8 to obtain the quantity of VOC emitted from the dryer. This accounts for the web retention factor of 20%. (See Attachment 1, page 2-7) for explanation of Web ("substrate") Retention Factor.

** Multiply VOC monthly emissions from dryer by the overall VOC control efficiency from the latest performance test to obtain monthly VOC emissions. This efficiency factor from the test of April 12, 2014 shall be used until such time as the Division approves new testing results.

Log 2 - Blanket Wash (Cleaning Solution) Emissions:

Month/year	Material Used	Amount Used (gal/mo)	Density (lb/gal)	VOC Weight Fraction	Rag Retention Factor* (%)	VOC Emissions (lb/mo)
	Blanket Wash				50	

* See Attachment 1, page 7 of Alternative Control Techniques Document: Offset Lithographic Printing for explanation of Rag Retention Factor.

Note: The company must make a one-time demonstration / calculation that, for the blanket wash (cleaning solution), the VOC composite partial pressure is less than 10 mm Hg at 68°F. This shall be submitted to the Division no less than 30 days after issuance of this permit. The Division may accept prior test results, if materials have not changed since test performed on April 12, 2014.

Log 3 - Fountain Solution Emissions- Uncaptured by Control Device

Month/year	Material Used	Amount Used (gal/mo)	Density (lb/gal)	VOC Weight Fraction	Direct Emissions* (%)	VOC Emissions (lb/mo)
	Fountain Solution				30	

*Multiply the total weight of VOC used by 30% to account for fugitive VOC which is not captured by the control device. See attached page 9 of Alternative Control Techniques Document: Offset Lithographic Printing (Attachment 1) for explanation of factor.

(conditions continued on next page)

Log 4 – Fountain Solution Emissions- Captured by Control Device

Month/year	Material Used	Amount Used (gal/mo)	Density (lb/gal)	VOC Weight Fraction	Capture System Efficiency* (%)	Destruction Efficiency of Control Device** (%)	VOC Emissions (lb/mo)
	Fountain Solution				70	98.8	

* Multiply the total weight of VOC used by 70% to account for VOC which is captured by the control device. See attached page 9 of Alternative Control Techniques Document: Offset Lithographic Printing (Attachment 1) for explanation of factor.

** This value is from the latest performance test of April 12, 2014. This efficiency factor shall be used until such time as the Division approves new testing results.

Log 5 – Calculation of Total VOC and HAP Emissions

Month/year	Material used	VOC Emissions (lb/mo) from previous Logs 1-4	HAP content (% by wt.)	HAP emissions (lb/month)
	Ink			
	Blanket Wash *			
	Fountain Solution**			
Total				

* Cleaning Solution

** Sum of uncaptured and captured emissions.

Log 6 - VOC and HAP Emissions per 12 Consecutive Months

Month/year	VOC Emissions (tons/mo)	VOC Emissions (tons) per 12 Consecutive Months *	HAP Emissions (tons/mo)	HAP Emissions (tons) per 12 Consecutive Months *

(*) The “(tons) per 12 Consecutive Months” value is the sum of the VOC (or HAP) emissions in the 11 months preceding the month just completed + the VOC (or HAP) emissions in the month just completed. If data is not available for the 11 months preceding the initial use of this Table, this value will be equal to the value for “(tons / mo)”. For the second month it will be the sum of the first month and the second month. Indicate in parentheses the number of months summed [i.e., 6 (2) represents 6 tons emitted in 2 months].

Calculations of monthly VOC and HAP emissions and the associated calculations of the twelve (12) consecutive month VOC and HAP emissions must be entered in the log no later than 30 days from the end of the month for which the data is required.

5. Should proof of compliance for the pollutants with emission limitations placed on this permit be required, the emissions measuring test methods and procedures are the following:

Pollutant or ParameterTesting Methodology

Volatile Content of Printing Inks

EPA Method 24 as published in the current 40 CFR 60, Appendix A

6. If this facility has actual emissions from stationary sources of 25 tons or more of volatile organic compounds (VOC) during a calendar year and/or 25 tons or more of nitrogen oxides (NO_x) during a calendar year, the facility shall report to the Technical Secretary the information and data concerning these emissions. This information and data shall be in the format prescribed by the Technical Secretary, and shall be submitted before March 31 of the year following the calendar year for which the information and data is reported. Each report shall be signed by an official of the company, certifying that the information and data contained in the report is true, accurate and complete to the best knowledge of the individual certifying the report. 1200-03-18-.02(8) and 1200-03-27-.02(6)

(conditions continued on next page)

7. This facility is subject to the provisions of 1200-03-18-.43: Offset Lithographic Printing Operations, including, but not limited to the following requirements as found in this permit. TAPCR 1200-03-18-.43(3)(g)

“Any person who owns or operates a heatset offset lithographic printing press subject to this rule shall reduce VOC emissions from the press dryer exhaust vent by 90 percent by weight of total organic (minus methane and ethane), or maintain a maximum control device outlet concentration of 50 ppmv, whichever is less stringent when the press is in operation.”

Compliance Method: According to prior testing of this source performed on April 12, 2014, permanent total enclosure was demonstrated (i.e. capture efficiency was 100%) and the average destruction efficiency was 98.8%. Therefore, the RTO has met the 90% by weight reduction limit for VOC emissions from this source. This efficiency factor shall be used until such time as the Division approves new testing results. The permittee shall assure continuing compliance by monitoring when the unit is operational, in accordance with 1200-03-18-.43(7)(a) and 1200-03-18-.83(2)(b)1(i) alternate compliance method.

8. In accordance with 1200-03-18-.43(3)(a), no owner or operator of a heatset web offset lithographic printing press subject to this rule shall apply any fountain solution unless the VOC content is equal to or less than one of the following:
- 1.6 percent VOC by volume of the fountain solution containing alcohol, as applied;
 - 3.0 percent VOC by volume of the fountain solution containing alcohol, as applied, if the fountain solution is refrigerated to less than 60° F.
 - 4.6 percent VOC by volume of the fountain solution, as applied, and use no alcohol in fountain solution.
 - 6.0 percent VOC by volume of the fountain solution, as applied, if the fountain solution is refrigerated to less than 60° F and use no alcohol in the fountain solution.

The permittee shall identify the above limitation to be met and keep appropriate records as indicated below to show compliance with the effective limit. A spreadsheet that lists all the fountain solutions currently used and the VOC content by volume of each fountain solution, information as to whether alcohol is present in the solution, and if the solution is refrigerated to less than 60°F shall be maintained.

9. When there is no alcohol used in the fountain solution, in order to demonstrate compliance with the maximum 4.6 percent VOC by volume limit for fountain solution specified at 1200-03-18-.43(3)(a)3, the company shall utilize the test procedure specified at 1200-03-18-.81 of the regulations. If only one formulation for fountain solution is used at the facility, the company shall certify this formulation and conduct one test in accordance with the above specified procedure. As long as this formulation does not change, the company is not required to conduct any more testing, but must keep a copy of the fountain solution formulation available for inspection by the Technical secretary or a Division representative. If there is only one formulation in use at the facility, the company must submit a copy of the formulation, a copy of the above specified test results for this formulation, and a statement that this formulation is the only one used at the facility to the Division within thirty days of issuance of this permit. If the formulation does change, the company shall submit to the Division (within 30 days of startup of use of the new material) the following information, in accordance with 1200-03-18-.43(8)(b), and must keep a record of this information at the facility:
- The name and identification number of each fountain solution as applied; and
 - The VOC content of fountain solutions, as applied, expressed in units of the applicable standard (as determined from the procedure specified at 1200-03-18-.81 of the regulations).
10. In accordance with 1200-03-18-.43(3)(e), no owner or operator of an offset lithographic printing press subject to this rule shall apply any cleaning solutions (blanket wash) unless:
- The VOC composite partial vapor pressure of the blanket wash (cleaning solutions) is less than 10 mm Hg at 20°C, as applied. To be in compliance, if applicable, each owner or operator of an offset lithographic printing press subject to this rule shall determine VOC composite partial pressure as given in TAPCR 1200-03-18-.43(4)(f); or

(conditions continued on next page)

- b. The VOC content of the blanket wash (cleaning solutions) is less than or equal to 30 percent by weight, as applied.

The permittee shall identify the above limitation which will be met and appropriate records kept as indicated below to assure compliance with the effective limit. A log of the cleaning solutions that explicitly lists the VOC content by weight or partial vapor pressure and temperature of the cleaning solution as applied shall be maintained. This information may be obtained by laboratory analyses or from manufacturer or vendor certification approved by the Technical Secretary.

11. In accordance with 1200-03-18-.43(7) and 1200-03-18-.03(5)(b), the following monitoring requirements apply:

To be in compliance with the emission control requirements of this rule, the affected facility shall collect and record the following information concerning the add-on dryer exhaust control device and shall maintain this information for three years:

- a. The owner or operator of a heatset offset lithographic printing press shall install, calibrate, maintain, and operate a temperature monitoring device, according to the manufacturer's instructions, at the outlet of the control device. The temperature monitoring device shall be equipped with a continuous recorder and shall have an accuracy of $\pm 0.5^{\circ}\text{F}$. Monitoring shall be performed when the unit is operational. TAPCR 1200-03-18-.43(7)(a) 1 & 2 and 1200-03-18-.83(2)(b)1(i) alternate compliance method.
- b. The company shall maintain records of all 3-hour periods of operation for which the average combustion temperature is more than 28°C (50°F) below the average combustion temperature of $1,533^{\circ}\text{F}$ measured during the most recent performance test from April 12, 2014, that demonstrated that the facility was in compliance. TAPCR 1200-03-18-.03(5)(b)9. [Note that the RTO was formerly located and tested as JTS Direct, LLC (83-0164).]
- c. A log of operating time for the capture system, control device, monitoring equipment and the associated line or operation. TAPCR 1200-03-18-.03(5)(b)(7).
- d. Any 3-hour period of operation of the incinerator which exhibits a deviation from the minimum temperature established during the latest performance testing shall be reported to the Technical Secretary in writing within 30 calendar days following the occurrence. TAPCR 1200-03-18-.03(5)(c)
- e. Records shall be maintained for a period of three (3) years. 1200-03-18-.03(5)(b)
- f. The dryer pressure shall be maintained lower than the press room air pressure such that air flows into the dryer at all times when the press is operating. An emissions capture efficiency of 100 percent for the dryer shall be demonstrated using an air flow direction measuring device. The Technical Secretary may require proof of compliance with this condition. TAPCR 1200-03-18-.43(7)(a)3.
- g. The owner or operator shall keep a maintenance log for the capture system, control devices, and monitoring equipment detailing all routine and non-routine maintenance performed including dates and duration of any outages. 1200-03-18-.03(5)(b)8.
- h. As a part of the testing protocol required by Condition 12h, the source owner or operator shall stipulate which procedures set forth in TAPCR 1200-03-18-.43(7)(b), (c), and (d) shall be utilized to monitor the fountain solution.

12. The permittee shall comply with the test methods and procedures as specified at 1200-03-18-.43(6) as follows:

- a. The affected facility shall be run at typical operating conditions and flow rates during any emission testing.
- b. Emission tests shall include an initial test, within 120 days of initial startup of new printers/dryers, when the control device is installed and operating that demonstrates compliance with either the 90 percent (by weight) reduction or the 50 ppmv emission limit. The test report shall be submitted within 30 days of the initial test. TAPCR 1200-03-18-.43(6)(b). [Note that the performance test conducted on April 12, 2014, while the facility operated as 83-0164 complies with the initial test requirements set forth in this permit condition.]
- c. In conducting the tests required to comply with Conditions 8, 10b, 22, or 23 of this permit, the owner or operator shall use the test methods specified in TAPCR 1200-03-18-.81.
- d. In conducting the tests required to comply with Condition 7 of this permit, the owner or operator shall use the test methods specified in TAPCR 1200-03-18-.84.

(conditions continued on next page)

- e. To be in compliance with the fountain solution refrigeration requirements of this rule, the affected facility shall use a thermometer or other temperature detection device capable of reading to 0.5°F to ensure that a refrigerated fountain solution containing alcohol is below 60°F at all times. TAPCR 1200-03-18-.43(6)(c)
 - f. To be in compliance with Condition 10a of this permit, if applicable, each owner or operator of an offset lithographic printing press subject to this rule shall determine VOC composite partial pressure as given in TAPCR 1200-03-18-.43(4)(f)
 - g. At least 30 days prior to the actual performance test the Technical Secretary shall be notified of the actual test date, so that the Technical Secretary or a Division representative may be present during this test. TAPCR 1200-03-18-.80
 - h. At least 30 days prior to the actual performance test date the source owner or operator shall submit a test protocol to the Technical Secretary for approval. The protocol shall also address the methodologies to be utilized to comply with Conditions 8, 10, and 11h of this permit. To be deemed acceptable, the protocol must address the methodologies to be utilized to demonstrate both the capture efficiency of the control equipment and the destruction efficiency of the RTO. TAPCR 1200-03-18-.80
 - i. The source owner or operator shall provide sampling ports and a suitable platform for the conducting of source emissions testing on the effluent gas stream of the source. TAPCR 1200-03-18-.80
13. Visible emissions from this source shall not exhibit greater than twenty percent (20%) opacity, except for one (1) six-minute period in any one (1) hour period, and for no more than four (4) six-minute periods in any twenty-four (24) hour period. Visible emissions from this source shall be determined by EPA Method 9, as published in the current 40 CFR 60, Appendix A (six-minute average). TAPCR 1200-03-05-.03(6) and 1200-03-05-.01(1)
14. Particulate matter emitted from the shared regenerative thermal oxidizer controlling emissions from the five (5) lithographic presses shall not exceed 0.02 grain per dry standard cubic foot of exhaust gas (1.94 pounds per hour). TAPCR 1200-03-07-.04(1)
15. Excess emissions shall be addressed as specified in Chapter 1200-03-20 of the TAPCR.
16. All records required by this permit shall be made available to the Technical Secretary or a Division representative upon request. These records shall be retained for a period of no less than three (3) years. TAPCR 1200-03-18-.03
17. No more than eleven (11) pounds of volatile organic compounds (VOC), or materials containing more than eleven (11) pounds of VOC, may be caused, allowed or permitted to be disposed in any one (1) day in a manner that would permit evaporation of VOC into the ambient air in excess of the "minimum reasonably attainable" emissions. The term "minimum reasonably attainable emissions" is defined at TAPCR 1200-03-18-.06(2).
18. This facility shall comply with TAPCR 1200-03-18-.06(3). This includes, but is not limited to, the use of all reasonable techniques for controlling evaporation during handling, storage, use, and disposal of VOC and VOC-contaminated materials as follows:
- a. achieved the "minimum reasonably attainable emissions", as this term is defined at TAPCR paragraph 1200-03-18-.06(2), required in TAPCR subparagraph 1200-03-18-.06(3)(a); and
 - b. reasonably minimized (VOC) evaporation as required in TAPCR subparagraph 1200-03-18-.06(3)(d).
19. No open containers shall be used for the storage or disposal of materials impregnated with VOC that are used for surface preparation, cleanup, coating removal, or facility or equipment cleaning or maintenance. TAPCR 1200-03-18-.06
20. No open containers shall be used for the storage of spent or fresh VOC to be used for surface preparation, cleanup, coating removal, or facility or equipment cleaning or maintenance, except as otherwise provided in TAPCR 1200-03-18-.06.

(conditions continued on next page)

21. No VOC shall be used for the cleanup of tools and process equipment, such as spray equipment, unless equipment is used to collect the cleaning compounds and to reasonably minimize their evaporation to the atmosphere. TAPCR 1200-03-18-.06(3)(d)
22. In accordance with 1200-03-18-.43(3)(b), no owner or operator of a non-heatset web offset printing press subject to this rule shall apply any fountain solution that contains alcohol, nor shall any fountain solution be applied unless the VOC content is equal to or less than 5.0 percent by weight of the fountain solution, as applied.
23. In accordance with 1200-03-18-.43(3)(d), no owner or operator of a sheet-fed offset lithographic printing press subject to this rule shall apply any fountain solution unless the VOC content is equal to or less than one of the following:
- 5.0 percent VOC by volume of the fountain solution, as applied;
 - 8.5 percent VOC by volume of the fountain solution, as applied, if the fountain solution is refrigerated to less than 60°F.
24. Only natural gas shall be used as fuel for this source.
25. Nitrogen oxides (NO_x) emitted from this source shall not exceed 8.24 tons during all intervals of twelve (12) consecutive months. TAPCR 1200-03-07-.07(2)
26. Carbon monoxide (CO) emitted from this source shall not exceed 6.45 tons during all intervals of twelve (12) consecutive months. TAPCR 1200-03-07-.07(2)
27. Regarding recordkeeping for this source, the following is applicable:
- For sources required to maintain monthly logs:
All data, including all required calculations, must be entered in the log no later than 30 days from the end of the month for which the data is required.
 - For sources required to maintain weekly logs:
All data, including all required calculations, must be entered in the log no later than 7 days from the end of the week for which the data is required.
 - For sources required to maintain daily logs:
All data, including all required calculations, must be entered in the log no later than 7 days from the end of the day for which the data is required.
- Logs and records specified in this permit shall be made available upon request by the Technical Secretary or a Division representative and shall be retained for a period of not less than five years unless otherwise noted. Logs and records contained in this permit may be based on a recommended format. Any logs that have an alternative format may be utilized provided such logs contain the same information that is required. Computer generated logs are also acceptable. TAPCR 1200-03-10-.02(2)(a)
28. This source shall comply with all applicable state and federal air pollution regulations. This includes, but is not limited to, federal regulations published under 40 CFR Part 63 for sources of hazardous air pollutants and 40 CFR Part 60, New Source Performance Standards. TAPCR 1200-03-09-.03(8)
29. The issuance of this permit does not exempt the permittee from any requirements of the U.S. Environmental Protection Agency pertaining to emissions from the operation of this source.
30. This source shall operate in accordance with the terms of this permit and the information submitted in the approved permit application. 1200-03-09-.01(1)(d)

(conditions continued on next page)

31. The press room in which this source is installed shall meet the following criteria to meet the requirements for a total enclosure and assure 100% capture of solvent being sent to the control device:
- a. Access doors and windows shall remain closed during routine operation.
 - b. The interior of the enclosure shall be kept at a negative pressure.
 - c. Air flow through all natural draft openings (NDO) shall be at least 200 feet per minute (fpm), with verification of continuous flow into the enclosure. (No verification is needed if flow into the enclosure is at least 500 fpm.)
 - d. Source(s) of VOC shall be at least four equivalent diameters away from NDO.
32. The permittee shall apply for renewal of this permit not less than sixty (60) days **prior to** the permit's expiration date pursuant to Division Rule 1200-03-09-.02(3).

(End of Conditions)

ATTACHMENT 1

EPA – GUIDELINE SERIES

CONTROL OF VOLATILE ORGANIC COMPOUND EMISSIONS FROM OFFSET LITHOGRAPHIC PRINTING

United States
Environmental Protection
Agency

Office of Air Quality
Planning and Standards
Research Triangle Park NC 27711

EPA-453/D-95-001
September 1995

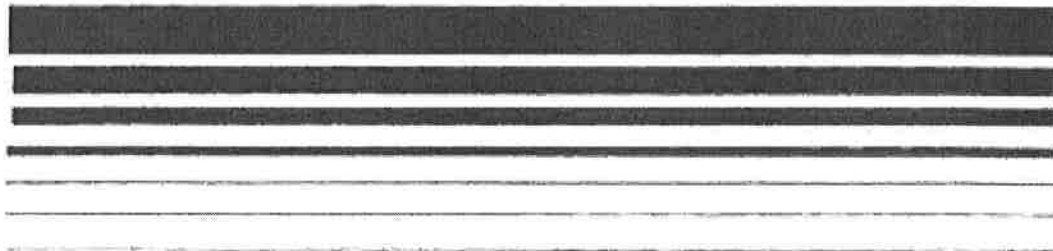
AN



Guideline Series

Control of Volatile Organic Compound Emissions from Offset Lithographic Printing

DRAFT



CTG

EPA LIBRARY SERVICES RTP NC

EPA-453/D-95-001

TECHNICAL DOCUMENT COLLECTION

recently been classified as hazardous air pollutants (HAP's) by the EPA in the CAA Amendments of 1990.

Depending on the printing process variables, difficulties have been reported in totally replacing alcohol with alcohol substitutes. Some printers assert that they cannot function without some alcohol in their fountain solution; however, the National Association of Printers and Lithographers (NAPL) and other printers believe that a commitment by management could result in lower alcohol use rates. The newspaper industry has successfully used nonalcohol additives.

2.4.3.2 Cleaning Solutions. A few cleaning solutions are available with a lower VOC content than traditional cleaning compounds, which are often 100 percent VOC. However, some lower VOC cleaning products contain HAP's. The VOC content of the lower VOC products without HAP's ranges from 0 to 30 percent. Lower VOC cleaning products that do not contain HAP's are carried by only a few vendors at this time. These products contain organic compounds that are not VOC's.

2.5 MODEL PLANT VOLATILE ORGANIC COMPOUND EMISSION ESTIMATES

2.5.1 Volatile Organic Compound Emissions From Inks

Ink use for the model plants was estimated from ink usage rates derived from surveys and other sources of information on the industry. The estimated average ink use for the model plants ranged from 1 to 14 tons per year (tpy) for non-heatset sheet-fed facilities, from 77 to 618 tpy for non-heatset and heatset web facilities (non-newspaper), and 10 to 2,155 tpy for newspaper facilities (non-heatset web).

The VOC emissions from ink use for the model plants were determined from the amount of ink used, the average amount of VOC in the ink, and the amount of VOC retained on the substrate. For heatset model plants, the VOC content of the ink was estimated at 40 percent VOC. Using a substrate retention factor of 20 percent VOC for heatset ink, the corresponding VOC emissions from the heatset model plants due to ink use ranged from 25 to almost 200 tpy.

For the non-heatset model plants, the substrate retention factor of VOC was estimated at 0.95, since the inks are



Alternative Control Techniques Document: Offset Lithographic Printing

Supplemental Information Based on

Public Comment on

Draft Control Techniques Guideline

Announced in Federal Register on

November 8, 1993

The logo for the Alternative Control Techniques (ACT) program, consisting of the letters "ACT" in a large, bold, outlined font.

ACT

A new development in the area of cleaning solvents is the availability of an offset lithographic ink that can be cleaned with water. This ink was developed by Deluxe Corporation and has been put in use at over 40 of their facilities since early 1993 in non-heatset web and sheet-fed production printing of checks and business forms. This ink is being used by other printers in production printing of greeting cards and brochures. Testing is being done on applying this ink to other end uses including heatset web printing.

Several commenters noted that in the draft CTG it was assumed that 100 percent of the VOC in the cleaning materials evaporated and was emitted. The comments noted that towels used for manual cleaning are still wet when cleaning is completed and that when the towels are kept in a closed container after use that they are still wet when sent for laundering or disposal (e.g., burning in a cement kiln). Further, some printers and some industrial laundries have installed centrifuges (extractors) to spin solvent out of used shop towels. This recovered solvent can be reused, distilled, rerefined or combusted. For cleaning materials with a VOC composite partial pressure less than 10mm Hg at 20°C about 50 percent of the VOC may remain in the towel after use. To limit evaporative losses, cleaning materials and used towels must be kept in closed containers.

In some automatic blanket washing systems, there may be collection of some of the liquid cleaning materials. An example would be overspray from the wetting of brushes or rollers. Clearly any material that is collected as a liquid for reuse or disposal has not evaporated. Further, the amount of cleaning material used in automatic blanket washing may be more closely controlled and may be less than is used in manual cleaning. There may also be carryover of automatic blanket wash material into heatset dryers where the carryover material can be controlled by the same device used to control ink oil emissions

automatic blanket wash materials used in both tests all had vapor pressures less than 10mm Hg at 20°C.

In the first test, a limited number of measurements were made on a production press at a printing facility. In the second test over 100 measurements were made under various press, dryer and automatic blanket washer operating conditions on a production size press at a pressmakers facility. Since there were a large number of runs at a variety of operating conditions in the second test and the results from the two tests were similar, 40 percent direct carryover of VOC from automatic blanket washing is a reasonable general assumption when the vapor pressure of the cleaning material is less than 10mm Hg at 20°C.

In the test conducted at a printing facility, a separate measurement was made of indirect capture. This refers to VOC from blanket washing that is first dispersed in the pressroom air and subsequently drawn into the dryer through the make-up air inlets over a long period of time. This VOC enters the pressroom air in various ways including as overspray from the process of wetting the cloth that wets and cleans the blanket, and from evaporation from the cloth over a period of time. In this test almost 40 percent of the VOC in the blanket wash material was found to be indirectly captured in the dryer. Since test results on indirect capture were presented for just one facility at its particular operating conditions and the amount of indirect capture would be affected by press and pressroom ventilation practice, no general assumption is made in this document about indirect carryover of VOC from automatic blanket wash materials.

For fountain solution, direct capture of VOC from alcohol substitutes was measured at a variety of operating conditions on the production size press at the pressmakers facility. The
* average result was about 70 percent direct capture. Since there were a large number of runs at a variety of operating conditions in the fountain solution test, 70 percent direct carryover of VOC

